

WORKSHEET

HUMAN RESPIRATORY SYSTEM

Name _____ Period _____ Date _____

A. Background Reading

When a person breathes in, air enters the respiratory system through the nose and sometimes through the mouth, and is warmed and moistened by the mouth cavity or by the twin **nasal passages**, chambers that open into the throat, or **pharynx**. The pharynx branches into the esophagus (the food tube to the stomach) and to the airways. At the beginning of the airways is the **larynx**, or “voice box,” which houses the vocal cords.

The larynx opens into the **trachea**, or windpipe, which is about as wide as a garden hose. Just below the larynx the trachea branches into two smaller airways called **bronchi** (singular, bronchus), each of which enters a lung. Finer and finer branching of the bronchi create an “upside down tree,” with thousands of thinner airways called **bronchioles**. The bronchioles eventually lead to millions of tiny, “grape-shaped” sacs called **alveoli** (singular, alveolus), where the oxygen-carbon dioxide gas exchange occurs. There are about 300 million alveoli in the human lungs, which if flattened, would cover an area as big as a tennis court!

When air pollutants such as dust, sand, etc. are inhaled; they travel through a filtering system of nasal hairs, mucus-coated linings, and twisted airways that keep all but the smallest particles out of the deepest part of the lungs. **Mucus** is a sticky and glutinous substance that is made from the mucus membrane lining in the respiratory system. Large particles are stopped by the nasal hairs and in the mucus-lined nasal passages. Smaller particles bypassing the nasal passages are trapped in the mucus lining from the trachea to the bronchiole airways.

There are several ways trapped particles are removed from the airways. They are by sneezing, coughing, and the mucus escalator. Sneezing expels the particles from the nasal region and coughing removes particles from the upper bronchi on up into the mouth where they can be expelled or swallowed. The mucus escalator involves **cilia** (singular, cilium), which are tiny hair-like structures that line the respiratory system, from the nose down through the smallest bronchiole. The cilia act like brooms and sweep the mucus and any mucus-trapped debris up toward the throat, to be swallowed or expelled.

Various air pollutants that are inhaled in high enough concentrations can irritate the mucus-lining causing too much mucus to be produced and cilia to be overworked, which can lead to obstruction (partial closing) of the airways. If a person is exposed to an air pollutant over a long period of time, cilia and cells in the mucus lining can eventually die, resulting in patches of scar tissue where excess mucus can build-up and cause continual breathing difficulties.

B. Using the information provided in the Background Reading section, answer the questions below in complete sentences:

1. What is the term given to the two main airways that branch off from the trachea?
2. What important process occurs in the alveoli?
3. What is mucus?
4. What are three ways in which trapped particles can be removed from the airways?
5. What is the purpose of cilia?
6. What can happen to the mucus lining and cilia of the airways if a high enough concentration of an air pollutant is inhaled?

- C. Using the terms and space provided below, draw and label the major parts of the human respiratory system.

Nasal Passages

Bronchus

Mucus

Pharynx

Bronchiole

Larynx

Alveolus

Trachea

Cilia

- D. Using the terms and space provided below, draw and label a cross section of a normal bronchiole and a cross section of an obstructed bronchiole:

Normal Bronchiole
Mucus

Bronchiole Muscle
Thick Secretions

Obstructed Bronchiole